VIRAL HEMORRHAGIC FEVERS

Report Immediately

✓DISEASE AND EPIDEMIOLOGY

Clinical Description:

Initial symptoms are nonspecific. Patients experience an insidious or sudden onset of progressive fever (that may be biphasic – occurring twice per day), chills, malaise, generalized myalgias and arthralgias, headache, anorexia, and cough. Most patients have a severe sore throat and may have abdominal pain, vomiting, and diarrhea.

Typical findings are not distinctive, including nonspecific conjunctival injection (bloodshot eyes), facial and truncal flushing, petechiae, purpura, ecchymoses (three types of rash), jaundice, epistaxis (nosebleed), gastrointestinal and genitourinary bleeding, and lymphadenopathy. Severe illness is associated with hypotension and shock, , pneumonitis (inflamed lungs), pleural and pericardial effusions, hemorrhage, encephalopathy, seizures, coma, and death.

- **Arenaviridae**
  - Patients with one of the South American HFs may present with conjunctivitis, pharyngeal enanthema with petechiae but without exudate, sore throat, or cough. Retrosternal pain is also a major symptom.
  - The South American HFs may be marked by encephalopathic changes, including intention tremor, cerebellar signs, convulsions, and coma.
  - Lassa fever often manifests with classic signs of meningitis.
  - Swollen baby syndrome describes severe Lassa fever in infants and toddlers with anasarca, abdominal distention, and spontaneous bleeding, but pediatric disease is otherwise not distinctive from that observed in older patients.
- **Bunyaviridae**
  - Patients with RVF develop retinal vasculitis that may cause permanent blindness.
  - Cotton wool spots (small white areas in the retina) are visible on the macula.
  - Severe disease is associated with bleeding, shock, anuria, and icterus.
  - Encephalitis may also occur without overlapping hemorrhagic fever.
  - The most severe bleeding and ecchymoses among the VHFs characterize CCHF.
- **Filoviridae**
  - Ebola virus causes clinically similar but more severe disease than the Marburg agent.
  - On about the fifth day of illness with Ebola or Marburg virus, a distinct morbilliform rash develops on the trunk, and an expressionless ghostlike facies has been described during this stage of illness.

- Patients with progressive disease hemorrhage from mucous membranes, venipuncture sites, and body orifices.
- Disseminated intravascular coagulation may be a feature of late disease.

Causative Agent:

Viral hemorrhagic fevers (VHFs) include numerous zoonotic diseases caused by different viruses, all of which result in a hemorrhagic syndrome in humans. VHFs are known to be caused by filoviruses, arenaviruses, and bunyaviruses,.

Arenaviruses: These are single-stranded RNA viruses that have rodents as the virus reservoirs. Hemorrhagic arenaviruses include Lassa and South American Hemorrhagic Fevers such as Junin, Machupo, Guanarito, and Sabio virus.

Bunyaviruses: These are small RNA viruses that have disease distribution based upon ecological factors. Hemorrhagic bunyaviruses include Rift Valley Fever and Crimean Congo hemorrhagic fever.

Filoviruses: These are elongated RNA viruses. Hemorrhagic filoviruses include Marburg and Ebola viruses.

Flaviviruses: These are single stranded RNA viruses. Dengue hemorrhagic fever is a viral hemorrhagic fever. Information about this disease is found in the dengue disease plan.

Differential Diagnosis:

In the absence of hospital or laboratory exposure these diseases are acquired almost exclusively in rural areas. Following an incubation period of 2 to 21 days, initial symptoms of all five VHFs are usually systemic and compatible with influenza: fever, myalgias, headache, and sometimes sore throat. At this point, such symptoms in a returning traveler who has a history of rural travel exposure, who has a history of contact with an ill individual or who has traveled to an area affected by an outbreak, could suggest a risk of VHF. However, the most likely diagnostic possibilities would still be the following more common infectious diseases:

- **Bacterial**
  Typhoid, other enteric fevers, pyelonephritis, pneumonia, sepsis meningococcal disease, invasive streptococcal disease, and leptospirosis.
- **Helminthic**
  Acute schistosomiasis, Katayama syndrome.
- **Protozoal**
  Malaria, amebic liver abscess.
- **Rickettsial**
  Typhus, Q fever, tickborne rickettsioses.
- **Viral**
  Mononucleosis, Dengue fever, hepatitis A, and acute HIV infection.

Conjunctivitis, petechiae, and in the case of filovirus infections, a morbilliform (measles-like) skin rash appear later and are more suggestive of VHF. It should be noted that these symptoms do not occur until the second week of illness. At this point, a reasonable

suspicion of VHF would exist in the presence of a compatible travel history, the absence of a history strongly suggestive of other illnesses, and at least one negative blood smear for malaria. Additionally, it should be remembered that individuals with indigenous malaria immunity may have parasitemia but may be symptomatic for other reasons, including VHF. The additional signs of hemorrhage and shock are strongly suggestive of VHF.

Laboratory identification:

Anyone suspecting a possible VHF should immediately notify public health. The identification of these agents should be handled by the Centers for Disease Control. These organisms can be identified via serology, PCR, and viral culture. These tests are typically done in a laboratory with higher level containment.

Treatment:

Patients receive supportive therapy, but generally speaking, there is no other treatment or established cure for VHFs. Ribavirin, an anti-viral drug, has been effective in treating some individuals with Lassa fever or Hemorrhagic Fever with Renal Syndrome (HFRS). Treatment with convalescent-phase plasma has been used with success in some patients with Argentine hemorrhagic fever.

Case fatality:

Mortality rates following development of clinical disease also vary depending on the agent and the strain; rates range from 10–90%. Rates have ranged from 50-90% for Ebola; 25 – 80% for Marburg; Crimean-Congo HF 2 – 50%.

Reservoir:

Many wild and domestic animals, ticks, and mosquitoes are known to carry some of the VHF agents, although reservoirs have not been identified for all VHF agents. Rodents are known to be the carriers of Lassa, Junin, Machupo, Guanarito, Crimean Congo hemorrhagic, and Rift Valley fever viruses. Mosquitoes, ticks, and animals (including rodents, foxes, hares, and groundfeeding birds) are known to carry bunyaviruses that cause VHFs. Primates are the only mammal group known to be affected by Ebola and Marburg hemorrhagic fever viruses. However, because these infections are associated with a rapid and often fatal illness, primates are not considered to be a reservoir. Once certain VHFs establish themselves in human populations, person-to-person spread may occur.

Transmission:

The mode of transmission of VHF in an individual case is typically animal, tick, or mosquito exposure. Once a human has acquired infection with a VHF agent, transmission may occur from person to person. Humans can become infected through contact with infectious blood or with secretions (such as urine, vomitus, pus, stool, semen, and saliva) from infected persons or animals. Individuals have acquired VHFs through sexual contact. Infants have acquired VHFs through birth and breastfeeding; although not all VHFs are transmitted via breast milk. Bedding or other objects may serve as a source of

infection. Medical equipment that has not been properly cleaned or sterilized has been responsible for the spread of some VHFs, and rarely, VHFs have been acquired by laboratory workers while manipulating specimens. For most VHFs, direct physical contact with infectious blood or secretions is thought to be required for transmission. However, for some VHFs, such as some of the arenaviruses, aerosol spread is considered likely.

The transmission risk of VHFs in the health care and laboratory setting is well documented. During the 1995 Ebola haemorrhagic fever outbreak in Kikwit (former Zaire, and now the Democratic Republic of the Congo), one fourth of the cases were in healthcare workers with a history of recent patient care.

Susceptibility:

Everyone not previously infected is susceptible, as infection usually confers immunity. Diseases with more than one serotype, such as Dengue, pose at risk of reinfection. Infection with one of the Bunyaviridae leads to full immunity.

Incubation period:

The incubation periods for VHFs range from 1–21 days, with an average of 3–10 days.

Period of communicability:

Infected individuals are generally considered to be infectious for a variable period preceding the onset of symptoms (up to about three weeks for some VHFs) and during the course of clinical symptoms. The virus may remain in the blood and in secretions for months after an individual recovers. Patients who survive continue to shed virus for weeks to months. Ebola virus has been isolated from seminal fluid 61 days after the onset of clinical disease, therefore, those patients should abstain from sexual intercourse for 3 months after infection. Contaminated bedding and medical equipment may remain infectious for several days. For some VHFs, the virus may remain viable for a variable duration post-mortem, permitting transmission from recently deceased patients.

Epidemiology:

In May 1995, these diseases came to worldwide attention with an outbreak of Ebola virus near the city of Kikwik, Zaire. VHFs are caused by a number of different viruses that infect wild animals, birds, mosquitoes, and ticks; taken together, VHFs are distributed over much of the globe. Individual VHFs, however, occur in different geographic regions, depending on where the host species are found, and people usually become infected only in those areas. Occasionally, a host that has been exported from its native habitat can infect people. A person can become infected in an area where a virus occurs naturally, and then by traveling elsewhere, can spread the disease from person to person. Because travel is now so common, outbreaks of these diseases are becoming threats in places where they have rarely or never been seen before.

In the US: Aside from the bunyaviral Hantavirus Pulmonary Syndromes (Bayou, Black Creek Canal, Four Corners, Muleshoe, Sin Nombre), which appears to be associated with

rodent-contaminated, abandoned, and closed buildings, and rare cases of Hemorrhagic Fever with Renal Syndrome, the only VHFs to occur in the United States are imported cases, most frequently Lassa fever or Dengue Hemorrhagic Fever. The first imported case of Lassa fever in more than 20 years occurred in New Jersey in 2004.

Internationally: Arenaviridae, including Guanarito (Venezuelan HF), Junin (Argentine HF), Machupo (Bolivian HF), Sabia (Brazilian HF), and Lassa viruses, are found throughout South America, particularly in the Argentine pampas, Bolivia, Venezuela, and rural Brazil near Sao Paulo. Arenaviridae are also found in West Africa (Lassa). Chronic infection of small field rodents makes rural residents and farmers the most frequently infected, with a strong seasonal predominance for the fall. In Argentina, agricultural workers are disproportionately infected. In Bolivia, rodents can invade towns and cause epidemics. In West Africa, Lassa fever is spread to humans when infected rodents are captured for consumption, as well as by person-to-person exposures. Outbreaks of Lassa fever have recently occurred in West Africa (April 2007).

Bunyaviridae (Crimean-Congo HF [CCHF], Rift Valley fever [RVF]) are seen throughout Africa, the Middle East, the Balkans, southern Russia, and western China.

Filoviridae (Ebola, Marburg viruses) are found in Africa and possibly in the Philippines. The vector is unknown, but infected primates sometimes provide a link for spread to humans. Later spread among humans or primates by close contact may also occur. Aerosol transmission is suspected in some monkey infections. It appears that outbreaks of Ebola disease often follow uncommonly dry periods, when rainfall resumes and reaches unusually high levels. Outbreaks of Marburg in Angola have been identified recently.

✓PUBLIC HEALTH CONTROL MEASURES

Public health responsibility:

- Investigate all suspect cases of disease and fill out and submit appropriate disease investigation forms.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention.
- Identify clusters or outbreaks of this disease.
- Identify sources of exposure and stop further transmission.
- Identify potential sources of transmission that may exist in the U.S. (such as non-human primates [NHPs] or laboratory specimens).
- Identify sources of transmission and geographical areas of risk outside of the U.S.
- Stop transmission from such sources and geographical areas.
- Identify cases as early as possible to prevent transmission to other persons or animals.
- Identify cases and clusters of human illness that may be associated with a bioterrorism incident.

Prevention:

To avoid cases of VHFs:

- Individuals should avoid traveling to areas with known outbreaks of VHFs.
- Laboratory workers handling specimens suspected of containing the agents of VHF must take appropriate biosafety precautions.
- Persons working with imported NHPs should know the signs of VHF in NHPs, and they should immediately report any cases of suspect or confirmed VHF in NHPs to the UDOH Bureau of Epidemiology.

Chemoprophylaxis:

Ribavirin has not proven effective with most cases of VHF. Post-exposure prophylaxis with ribavirin may be considered for high-risk contacts of patients with Crimean-Congo hemorrhagic fever. The prophylactic regimen is ribavirin 500 mg by mouth every 6 hours for 7 days.

Vaccine:

None

Isolation and quarantine requirements:

Isolation: Patient should be isolated as soon as possible to prevent further spread to others.

Isolation of patient during convalescence

Virus may be excreted into the urine for weeks after recovery has begun. Disinfectant (e.g., household bleach) should be added to the toilet bowl prior to urinating or flushing for 6 weeks of convalescence or until patient has a negative culture for the virus. The average toilet contains ~ 1 Gallon of water in the toilet bowl prior to flushing. Place 50 to 100 cc of bleach in the toilet prior to urinating. Wait 5 minutes and then flush.

Postmortem

If the patient should die, handling of the body should be minimal. The corpse should be wrapped in a sealed leak-proof material, not embalmed, and then cremated or buried promptly in a sealed casket.

Hospital:

The patient should be admitted to a private room. While a room with negative air flow is not necessary at this stage, it may be necessary if the disease progresses; therefore, admitting the patient to a room with negative air flow at this stage may circumvent transfer later.

1. Isolate the patient.
2. Wear protective clothing in the isolation area, in the cleaning and laundry areas and in the laboratory. Wear a scrub suit, gown, apron, two pairs of gloves, mask, headcover, eyewear, and rubber boots.
3. Clean and disinfect spills, waste, and reusable equipment safely.
4. Clean and disinfect soiled linens and laundry safely.
5. Use safe disposal methods for non-reusable supplies and infectious waste.
6. Provide information about the risk of VHF transmission to health facility staff. Reinforce use of VHF Isolation Precautions with all health facility staff.
7. Provide information to families and the community about prevention of VHFs and care of patients.

Isolating the VHF patient will:

- Restrict patient access to health facility staff trained to use VHF Isolation Precautions.
- Establish a barrier between the VHF patient and uninfected patients, other health facility staff, and visitors.

Quarantine: Individuals who have had any contact with infectious patients should be monitored by their health care provider for the maximum incubation period for the specific agent.

✓CASE INVESTIGATION

Reporting:

Any suspect or confirmed case of VHF or of any potential exposure to an agent which could cause VHF, must be called to the UDOH Bureau of Epidemiology immediately.

Case definition: There is no formal CDC case definition for VHFs

Definitions used during African outbreaks:

The case definition for suspecting Ebola hemorrhagic fever (EHF) is:

Anyone presenting with fever and signs of bleeding such as: • Bleeding of the gums • Bleeding from the nose

- Red eyes
- Bleeding into the skin (purple coloured patches in the skin)
- Bloody or dark stools
- Vomiting blood
- Other unexplained signs of bleeding

Whether or not there is a history of contact with a suspected case of EHF.

OR

Anyone living or deceased with:

- Contact with a suspected case of EHF **AND**
- A history of fever, with or without signs of bleeding.

OR

Anyone living or deceased with a history of fever **AND** 3 of the following symptoms:

- Headache
- Vomiting
- Loss of appetite
- Diarrhea
- Weakness or severe fatigue
- Abdominal pain
- Generalized muscle or joint pain
- Difficulty swallowing
- Difficulty breathing
- Hiccups

OR

Any unexplained death in an area with suspected cases of EHF.

The case definition for suspecting Lassa fever is:

Unexplained **fever** at least 38°C or 100.4°F for one week or more.

And 1 of the following:

- No response to standard treatment for most likely cause of fever (malaria, typhoid fever, severe bacterial infection)

- Readmitted within 3 weeks of inpatient care for an illness with fever

And 1 of the following:

- Edema or bleeding
- Sore throat and retrosternal pain/vomiting
- Spontaneous abortion following fever
- Hearing loss following fever

Clinical Description

Common Clinical Features of VHFs

Disease	Incubation Period	Case Fatality	Characteristic Features
Crimean Congo HF	3-12 days	15%-30%	Most severe bleeding and ecchymoses (a purplish patch caused by blood coming from a vessel into the skin) of all the HF.
Ebola HF and Marburg HF	2-21 days	25%-90%	--Most fatal of all HF. -- Weight loss. --Exhaustion and loss of strength. --A maculopapular (a lesion with a broad base) rash is common --Post infection events have included hepatitis, uveitis and orchitis.
Lassa Fever	5-16 days	Approximately 15%	--Exhaustion and loss of strength. --Shock. --Deafness develops during recovery in 20% of cases.
Rift Valley Fever	2-5 days (uncomplicated disease; incubation for HF may differ)	50% of severe cases (about 1.5% of all infections)	--Shock. -- Bleeding. --Reduced or no urine production. --Jaundice. --Inflammation of the brain. --Inflammation of the blood vessels in the retina of the eye.
Yellow Fever	3-6 days	20%	-- Acute febrile period followed by a brief period of remission. --Toxic phase follows remission with jaundice and renal failure in severe cases.

Specific Clinical Findings in Different VHFs

Disease	Crimean	Ebola HF and	Lassa	Rift Valley	Yellow Fever

	Congo HF	Marburg HF	Fever	Fever	
haemorrhage	+++	++	+ ranging to S	+++	+++
thrombo-cytopenia [1]	+++	+++	+	+++	++
leukocyte count [2]	⇊ranging to ↑	data not available	no change	data not available	no change ranging to ⇊
rash		+++	++		
icterus[3]	++	++		++	+++
renal disease				+	++
pulmonary disease	+	+	+	data not available	+
tremor[4] dysarthria[5]			+		
encephalo-pathy[6]	+	++	+ ranging to S	E	++
deafness		+	++		
eye lesions		Retinitis		Retinitis	

[1] abnormally low number of platelets in the circulating blood

[2] white blood cell count

[3] jaundice

[4] shaking

[5] difficulty speaking and pronouncing words due to problems with the muscles used for speaking

[6] disease of the brain

+ occasional or mild

++ commonly seen and may be severe

+++ characteristic

S characteristic and seen in severe cases

↑occasionally or mildly increased

⇊commonly decreased

E May develop true encephalitis

Laboratory Criteria

Diagnostic Test	Samples required	Preparation & Storage	Shipping	Viruses to be confirmed
ELISA (Serology) Detects: • Viral antigen • IgM and IgG	Whole blood***** Serum or plasma Acute and convalescent******	Freeze or refrigerate (as cold as possible)	Frozen on dry ice or ice packs or both********	Ebola Lassa CCHF Rift Valley Marburg Yellow fever

antibody				
PCR Detects: DNA, RNA (genetic material) from virus	Whole blood or clot***** Tissues (fresh frozen) Serum/plasma	Refrigerate or freeze Freeze	Frozen on dry ice or ice packs or both******	Ebola Lassa CCHF Rift Valley Marburg Yellow fever
Immunohisto-chemistry (liver) Detects: Viral antigen in cells	Liver biopsy from fatal cases	Fix in formalin (can be stored up to 6 weeks)	Room temperature (Do not freeze)	Ebola Lassa CCHF Rift Valley Marburg Yellow fever
Immunohisto-chemistry (skin) Detects: Viral antigen in cells	Skin biopsy from fatal cases (any site)	Fix in formalin (can be stored up to 6 weeks)	Room temperature (Do not freeze)	Ebola Lassa
Immunohisto-chemistry (other tissues) Detects: Viral antigen in cells	Tissue biopsy from fatal cases (other tissues, spleen, lung, heart, kidney)	Fix in formalin (can be stored up to 6 weeks)	Room temperature (Do not freeze)	**Possible detection** of Ebola, Lassa, CCHF, Rift Valley, Marburg, Yellow Fever

***** Whole blood can be used for enzyme-linked immunosorbent assay (ELISA) and may be frozen. Do not centrifuge suspected VHF specimens because this increases risk to the lab worker. If serum specimens have already been prepared these can be used. Place specimens in plastic tubes for shipping and storage and be sure that the tubes are sealed and properly labeled.

****** Collect acute-phase specimen when patient is admitted to hospital or diagnosed as suspected case and collect convalescent-phase specimen at death or when discharged from the hospital.

******* Whole blood or tissue is preferred, although serum or plasma may provide results.

******** Use both ice packs and dry ice to provide best results. If dry ice or ice packs are not available, sample may be shipped at room temperature and still provide valid results in most cases.

Case Classification

Suspect or Confirmed based on clinical symptoms and laboratory findings. See Attachment A for identifying suspect VHF cases. A confirmed case has laboratory evidence of a VHF.

Nosocomial:

Nosocomial cases of VHFs are quite common. Report all suspect nosocomial cases to hospital Infection Control Practitioner (ICP) and UDOH immediately to ensure proper infection control precautions are implemented. For suspect cases of VHF, contact with the ICP should occur on patient admission.

Hospital Infection Control

To reduce the risk of disease transmission in the health care setting, use the following Standard Precautions.

1. Wash hands immediately with soap and water before and after examining patients and after any contact with blood, body fluids and contaminated item--whether or not gloves were worn. Soaps containing an antimicrobial agent are recommended.

2. Wear clean, ordinary thin gloves anytime there is contact with blood, body fluids, mucous membrane, and broken skin. Change gloves between tasks or procedures on the same patient. Before going to another patient, remove gloves promptly and wash hands immediately, and then put on new gloves.

3. Wear a mask, protective eyewear and gown during any patient-care activity when splashes or sprays of body fluids are likely. Remove the soiled gown as soon as possible and wash hands.

4. Handle needles and other sharp instruments safely. Do not recap needles. Make sure contaminated equipment is not reused with another patient until it has been cleaned, disinfected, and sterilized properly. Dispose of non-reusable needles, syringes, and other sharp patient-care instruments in puncture-resistant containers.

5. Routinely clean and disinfect frequently touched surfaces including beds, bed rails, patient examination tables and bedside tables.

6. Clean and disinfect soiled linens and launder them safely. Avoid direct contact with items soiled with blood and body fluids.

7. Place a patient whose blood or body fluids are likely to contaminate surfaces or other patients in an isolation room or area.

8. Minimize the use of invasive procedures to avoid the potential for injury and accidental exposure. Use oral rather than injectable medications whenever possible.

When a specific diagnosis is made, find out how the disease is transmitted. Use precautions according to the transmission risk.

- **If airborne transmission:**

    1. Place the patient in an isolation room that is not air-conditioned or where air is not circulated to the rest of the health facility. Make sure the room has a door that can be closed.

    2. Wear a HEPA or other biosafety mask when working with the patient and in the patient's room.

    3. Limit movement of the patient from the room to other areas. Place a surgical mask on the patient who must be moved.

- **If droplet transmission:**

    1. Place the patient in an isolation room.

    2. Wear a HEPA or other biosafety mask when working with the patient.

    3. Limit movement of the patient from the room to other areas. If patient must be moved, place a surgical mask on the patient.

- **If contact transmission:**

    1. Place the patient in an isolation room and limit access.

    2. Wear gloves during contact with patient and with infectious body fluids or contaminated items. Reinforce handwashing throughout the health facility.

    3. Wear two layers of protective clothing.

    4. Limit movement of the patient from the isolation room to other areas.

    5. Avoid sharing equipment between patients. Designate equipment for each patient, if supplies allow. If sharing equipment is unavoidable, clean and disinfect it before use with the next patient.

Case Investigation Process:

1. Following immediate notification of the UDOH, the LHD may be asked to assist in investigating any case living within their community, including gathering the following information:

a. The case's name, age, address, phone number, status (e.g., hospitalized, at home, deceased), and parent/guardian information, if applicable.

b. The name and phone number of the hospital where the case is or was hospitalized.

c. The name and phone number of the attending physician.

d. The name and phone number of the infection control official at the hospital.

e. If the patient was seen by a health care provider before hospitalization or seen at more than one hospital, these names and phone numbers.

2. Please complete the VHF form and include the following information:

a. Record the case's demographic information.

b. Accurately record clinical information including "Viral Hemorrhagic Fever" as the disease being investigated, the type of VHF, if known (e.g., Ebola, Marburg, Lassa, Junin, Machupo, Sabia, Guanarito, Crimean Congo hemorrhagic, or Rift Valley fevers), date of symptom onset, symptoms, whether hospitalized, and hospital and clinician contact information.

c. Include all available diagnostic laboratory test information that is available.

d. Record information relevant to prevention and control. Use the incubation period range for VHFs (2−16 days, varying by etiologic agent). Specifically, focus on the period beginning a minimum of 2 days prior to the case's onset date back to no more than 16 days before onset for travel history. Determine the date(s) and geographic area(s) of travel to identify where the patient may have become infected.

e. Include any additional comments regarding the case.

f. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.

Outbreaks:

An outbreak will be defined as: One case of VHF in Utah may be considered an outbreak, as this disease has never been seen in the United States. A source of infection,

such as travel to a geographical region where a known outbreak of VHF is occurring, should be sought, and applicable preventive or control measures should be instituted.

Identification of case contacts:

Identify all other potentially exposed persons immediately.

Case contact management:

A contact is defined as a person who has been exposed to an infected person or to an infected person's secretions, excretions, or tissues from the patient's onset of illness until 3 weeks after onset. Contacts may be subdivided into three levels of risk.

1. **Casual contacts** are persons who have not had close personal contact with the ill patient. These include persons on the same airplane, in the same hotel, visitors to the patient's home, etc. Since the agents associated with VHFs are usually not spread during such contact, no special surveillance is indicated unless the patient had acute respiratory involvement with intense sneezing and coughing. In such situations, exposed persons should be placed under surveillance for "close contacts". In most cases, occupational contacts of suspected patients will fall into this category.

2. **Close contacts** are persons who have had more than casual contact with the patient. They include persons living with the patient, nursing or serving the patient, skin-to-skin contact with or hugging the patient, and handling the patient's laboratory specimens, before the recognition of the nature of the diagnosis. These contact persons should be identified by local health departments, in collaboration with UDOH, as soon as VHF is considered a likely diagnosis for the index case. Once the diagnosis is confirmed, close contacts should be placed under surveillance. These individuals should record their temperature twice daily and report any temperature >=100.9 F or any symptom of illness to the public health officer responsible for surveillance. Surveillance should be continued for 3 weeks after the person's last contact with the index patient.

   Surveillance is not indicated for routine occupational contact with patients in situations where the diagnosis has been considered and appropriate isolation precautions implemented.

3. **High-risk contacts** are persons who have had mucous membrane contact with the patient, such as kissing or sexual intercourse, or have had a needle stick or other penetrating injury involving contact with the patient's secretions, excretions, blood, tissues, or other body fluids. These individuals should be placed under surveillance as soon as VHF is considered a likely diagnosis in the index case.

Any close or high-risk contact who develops a temperature of >=100.9 F or any other symptoms of illness should be immediately isolated and treated as a VHF.

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Attachment A

Identifying Suspect VHF cases